COMMON PRE-BOARD EXAMINATION

MATHEMATICS (BASIC-MS)–Code No. 041

CLASS-X-(2025-26)

SET: 3

Time allowed: 3 Hrs. **Maximum Marks: 80**

	Questions	Marks
1.	(C) -77	1
2.	(C) $\frac{\sqrt{q^2-p^2}}{p}$	1
3.	(C) 4	1
4.	(C) 5	1
5.	(C) 6.4 cm	1
6.	(B) 462cm^2	1
7.	(C) a segment	1
8.	(C) 5	1
9.	(A) 27	1
10.	(B) 1200	1
11.	(B) -6	1
12.	(C) 424.5	1
13.	(B) 2.3	1
14.	(C) 4	1
15.	(A) Sum of their radii	1
16.	(D) ac $= \frac{b^2}{4}$	1
17.	(D) $\frac{1}{3}$	1
18.	(C) 96°	1
19.	(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)	1
20.	(C) Assertion (A) is true, but Reason (R) is false	1
21.(A)	sin A cos B + cos A sin B = sin45°cos30°+cos45°sin30°	½
	$= \frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2} + \frac{1}{\sqrt{2}} \times \frac{1}{2}$	½
	$= \frac{\sqrt{3}+1}{2\sqrt{2}}$	½
	$= \frac{\sqrt{2}(\sqrt{3}+1)}{4}$	½

OR

$\sin^2 30^0 + \cos^2 45^0 - \cos 0^0 \times \tan 45^0$

$= \left(\frac{1}{2}\right)^2 + \left(\frac{1}{\sqrt{3}}\right)^2 - 1 \times 1$ 1

$= \frac{1}{4} + \frac{1}{2} - 1$ ½

$= \frac{1+2-4}{4} = \frac{-1}{4}$ ½

22. $6x^2 - 7x - 3 = 0$
By splitting middle term:
$6x^2 - 9x + 2x - 3 = 0$ ½
$3x(2x - 3) + 1(2x - 3) = 0$
$(2x - 3)(3x + 1) = 0$ ½
$\therefore x = 3/2, x = -1/3$
Sum of zeroes = $\frac{3}{2} + \frac{-1}{3} = \frac{7}{6}$, $\frac{-b}{a} = \frac{-(-7)}{6} = \frac{7}{6}$ ½
Product of zeroes = $\frac{3}{2} \times \frac{-1}{3} = \frac{-1}{2}$, $\frac{c}{a} = \frac{-3}{6} = \frac{-1}{2}$ ½
Hence verified.

23. Let the integers be x and x+1 ½
$x(x+1) = 306$

$x^2 + x - 306 = 0$ ½

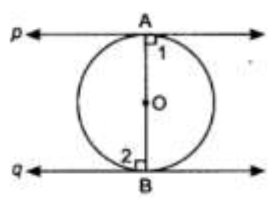
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$ ½

$x = \frac{-1 \pm \sqrt{1^2 + 1224}}{2}$

$x = \frac{-1 \pm 35}{2} = 17$

Therefore the integers are ½
17 and 18

24.



½

AB is a diameter of the circle, p & q are two tangents, OA⊥p and OB⊥q (radius is perpendicular to tangent through the point of contact) ½
Therefore ∠1 = ∠2 = 90° ½
⇒ p // q (∠1 and ∠2 are alternate interior angle) ½

25. (a) $6 = 2 \times 3$
$72 = 2^3 \times 3^2$ ½
$120 = 2^3 \times 3 \times 5$ ½
HCF = $2^1 \times 3^1 = 6$ ½
½

LCM = $2^3 \times 3^2 \times 5 = 360$

OR

½

(b) Time taken by cyclists = 30, 40, 48 minutes 1

Identify LCM ½

LCM of (30, 40, 48) = 240 minutes

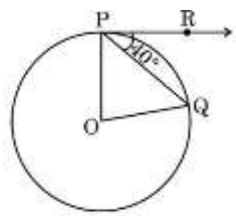
∴ They will meet again after 240 minutes (4 hours).

26. Given ∠QPR = 40° (angle between tangent and chord PQ). 1

∠POQ = 2 × ∠QPR = 80°.

∴ Measure of ∠POQ = 80° 1

1



OR

AP= BP(tangents from external point P)

½

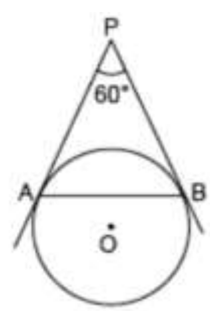
∠PAB = ∠PBA(angles opposite to equal sides) ½

∠APB +∠PAB +∠PBA = 180° ½

∠PAB = 60° ½

ΔAPB is an equilateral triangle. ½

AB=AP = 5cm ½



27. LHS = $(\sin\theta + \text{cosec}\,\theta)^2 + (\cos\theta + \sec\theta)^2$

$= \sin^2\theta + 2\sin\theta\,\text{cosec}\theta + \text{cosec}^2\theta + \cos^2\theta + 2\sec\theta\cos\theta + \sec^2\theta$ ½

$= \sin^2\theta + 2 + \text{cosec}^2\theta + \cos^2\theta + 2 + \sec^2\theta$ ½

$= 4 + (\sin^2\theta + \cos^2\theta) + (\sec^2\theta + \text{cosec}^2\theta)$ ½

$= 5 + (1 + \tan^2\theta + 1 + \cot^2\theta)$ ½

½

$= 7 + \tan^2\theta + \cot^2\theta.$ ½

Hence proved.

28. Assume $\sqrt{2} - \sqrt{5}$ is rational = r. ½

Then $\sqrt{2} = r + \sqrt{5}$

$\Rightarrow \sqrt{2} - r = \sqrt{5}$ ½

Squaring both sides:

$2 - 2r\sqrt{2} + r^2 = 5 \Rightarrow -2r\sqrt{2} = 3 - r^2.$ ½

$\Rightarrow \sqrt{2} = \frac{r^2 - 3}{2r}$ ½

RHS is rational ($\frac{integer}{integer}$) ½

LHS $= \sqrt{2}$, rational. ½

LHS $\neq RHS$ contradiction.

$\therefore \sqrt{2} - \sqrt{5}$ is irrational

29. Integers between 50 and 500 divisible by 7: 56, 63, …, 497. ½

$n = \frac{[(497 - 56)}{7} + 1 = 64.$ ½

Sum $= \frac{n}{2}(a + a_n)$ ½

$= \frac{64}{2} \times (56 + 497)$ ½

$= 32 \times 553$ ½

$\therefore$ Sum = 17,696. ½

30.

C I	f	cf
65 - 85	7	7
85 - 105	8	15
105 - 125	7	22
125 - 145	20	42
145 - 165	14	56
165 - 185	9	65
185 - 205	5	70

½

Median class is 125-145 ½

Median $= l + \frac{(\frac{n}{2} - cf)}{f} \times h$ ½

$= 125 + \frac{35-22}{20} \times 20$ ½

= 125 + 13 ½

½

= 138

31. Let original length = x, breadth = y. ½

$(x-5)(y+3) = xy - 9$ …(1)

$(x+3)(y+2) = xy + 67$ …(2)

Expanding: ½

$xy + 2x + 3y + 6 = xy + 67 \Rightarrow 2x + 3y = 61$ …(A)

$xy - 5y + 3x - 15 = xy - 9 \Rightarrow -5y + 3x = 6$ ...(B)

Solving (A) and (B): From (B), $3x = 5y + 6$

½

$\Rightarrow x = \frac{5y+6}{3}$

Substitute in (A): $\frac{2(5y+6)}{3} + 3y = 61$ ½

$\Rightarrow 19y + 12 = 183 \Rightarrow y = 9$.

Then $x = \frac{5\times9+6}{3} = \frac{51}{3} = 17$.

∴ Dimensions: length = 17 units, breadth = 9 units.

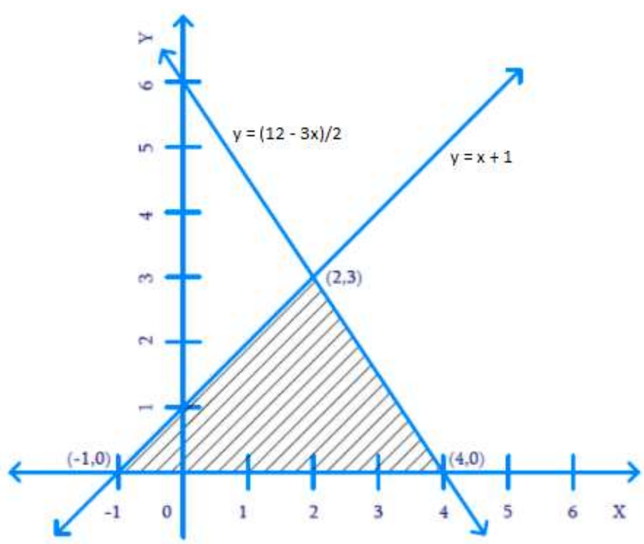
½

½

OR 1

Solutions of $x - y + 1 = 0$ are (-1,0), (2,3) and (2,2)

And solutions of $3x + 2y - 12 = 0$ are (0,6) , (2 ,3) and (4,0) ½



1

Vertices of the triangle are (2,3), (4,0) and (-1,0).

1½

32. The volume of the cuboidal portion of the shed is given by the formula

½

V cuboid=length × width × height 1

$= 14 \times 20 \times 7 = 1960\text{m}^3$ 1

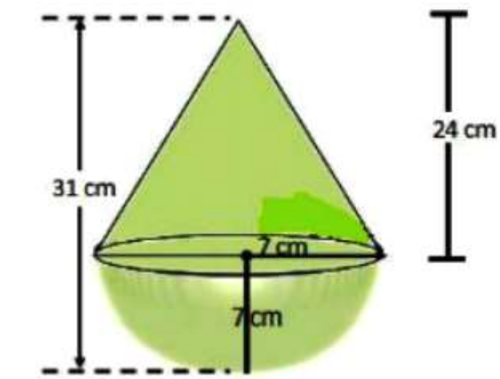
Volume of the half cylinder $= \frac{1}{2}\pi r^2 h = \frac{1}{2}\pi \times 7^2 \times 20 = 1540\text{m}^3$

Total volume $= 1960 + 1540 = 3500\text{m}^3$ 1

Space occupied by machinery $= 400\text{m}^3$ ½

Therefore remaining space $= 3500 - 400 = 3100\text{m}^3$ 1

OR



½

Total height of the toy is 31 cm.

Radius of hemisphere = 7 cm. ½

∴ The height of the cone is h = 31 – 7 = 24 cm. ½

Radius of cone is r = 7cm.

∴ The slant height of the cone is $l = \sqrt{r^2 + h^2} = \sqrt{7^2 + 24^2}$ ½

$= \sqrt{625} = 25$ cm. ½

Total surface area of toy = surface area of hemisphere + surface area of cone.

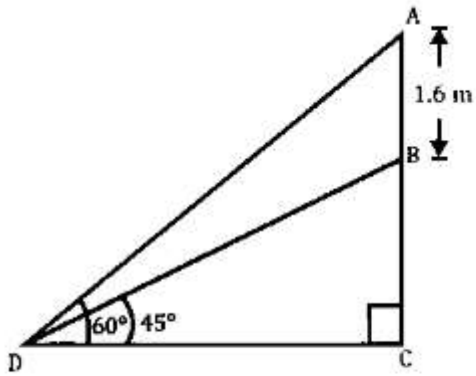
$= 2\pi r^2 + \pi r l = \pi r\,(l + 2r)$ 1

$= \frac{22}{7} \times 7\,(2 \times 7 + 25)$ ½

$= 22 \times (14 + 25)$

$= 22 \times 39 = 858\ \text{cm}^2$. 1

33.



1

In ΔBCD,

tan 45° = $\frac{BC}{CD}$ ½

1 = $\frac{BC}{CD}$

½

Thus, BC = CD

In ΔACD, In ΔACD,

tan 60° = $\frac{AC}{CD}$ ½

tan 60° = $\frac{AB+BC}{CD}$

½

$\sqrt{3}$ = $\frac{1.6+BC}{BC}$ [Since BC = CD]

½

$\sqrt{3}$ BC = 1.6 + BC

$\sqrt{3}$ BC - BC = 1.6

BC ($\sqrt{3}$ - 1) = 1.6

BC = $\frac{1.6}{\sqrt{3}-1} = \frac{1.6}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1}$

= $\frac{1.6\,(\sqrt{3}+1)}{2}$ ½

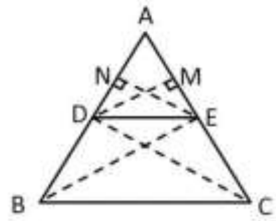
= 0.8 ($\sqrt{3}$ + 1)

½

Height of pedestal BC = 0.8 ($\sqrt{3}$ + 1) m.=2.185

½

34. Theorem: A line drawn parallel to one side of a triangle divides the other two sides in the same ratio.
Proof:



½

Consider ΔABC, line DE ∥ BC intersects AB, AC at D and E.
Draw CE ∥ AD meeting BC at F. ½

In ΔADE and ΔDBE

Ar(ΔADE) $= \frac{1}{2} \times AD \times EN$ ½

Ar(ΔDBE) $= \frac{1}{2} \times DB \times EN$

$\frac{\text{Ar}(\Delta ADE)}{\text{Ar}(\Delta DBE)} = \frac{AD}{DB}$ ------(1)

½

Also in ΔADE and ΔECA

Ar(ΔADE) $= \frac{1}{2} \times AE \times DM$

½

Ar(ΔECD) $= \frac{1}{2} \times EC \times DM$

$\frac{\text{Ar}(\Delta ADE)}{\text{Ar}(\Delta ECD)} = \frac{AE}{EC}$ ------(2)

½

But ΔDBE and $\Delta ECD$are on the same base and between the same parallels. ½

Hence ar(ΔDBE) = $ar(\Delta ECD)$-----(3) ½

Therefore , from (1) , (2) and (3) , $\frac{AD}{DB} = \frac{AE}{EC}$ 1

35. Distance = 300 km, speed = x km/h, ½
time = $\frac{300}{x}$ hours. ½
When speed increased by 5 km/h, time = $\frac{300}{(x+5)}$ hours, 2 hours less. ½
$\frac{300}{x} - \frac{300}{(x+5)} = 2$

1

$\Rightarrow \frac{300(x+5)}{x(x+5)} - \frac{300x}{x(x+5)} = 2$ ½

$\Rightarrow\ 2x^2 + 10x - 1500 = 0$ ½

$\Rightarrow\ x^2 + 5x - 750 = 0$ ½

Solving $x = 25$ (since speed can't be negative) ½

∴ Original speed = 25 km/h. ½

OR

Let incomes = 9x, 7x and expenditures = 4y, 3y. ½+½
Savings = 9x – 4y = 2000, 7x – 3y = 2000. ½
Solving: (9x – 4y) – (7x – 3y) = 0 ½
⇒ 2x – y = 0 ½
⇒ y = 2x. ½
Substitute in first: 9x – 8x = 2000 ½
⇒ x = 2000. ½
∴ Incomes: 9x = ₹18,000, 7x = ₹14,000. ½ + ½

36. (i) Probability that the selected family has two or three children= 19+7 = 26% 1

(ii) Probability that the selected family has more than two children = 7+3 = 10% 1

(iii) Probability that the selected family has more than one child.= 19+7+3 = 29% 2

OR

(iii) Probability that the selected family has less than three children = 51+20+19 = 90%

37. Coordinates of A = (1, 9), B = (5, 13) 1

Coordinates of C = (9, 13), D = (13, 9) 1

Midpoint = $(\frac{9+13}{2}, \frac{13+9}{2})$ = (11, 11)

Coordinates of M = (5, 11), N = (9, 11) 2

MN = $\sqrt{4^2 + 0^2}$ = 4

OR

The point which divides MN in the ratio 1:3 is $(\frac{9+15}{4}, \frac{11+33}{4})$ = (6, 11) 2

38. (i) $\angle ROS = \frac{360}{8} = 45°$ 1

(ii) Perimeter of sector OPQ = $21+21+\frac{1}{8} \times 2 \times \frac{22}{7} \times 21$ = 58.5cm 1 (iii)(A)Area of shaded region PQRS = $\frac{1}{8} \times \pi\ (R^2 - r^2)$ = $\frac{1}{8} \times 3.14\ (21^2 - 10^2)$

= $\frac{1}{8} \times 3.14 \times 341$ = 133.84cm^2 2

OR

(iii)(B)Area of shaded region ACB

i.e. the segment ACB 2

= ¼ πr^2- area of ΔOAB

= $\frac{1}{4} \times 3.14 \times 100 - \frac{1}{2} \times 10 \times 10$ = 78.5 – 50 = 28.5cm